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Jhuming Cultivation A Threat to Bio-diversity of North-East India: A Case Study

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Abstract

In Northeast India jhuming is a widely practiced food production system. It has been criticized on ecological and socio-economic grounds. Large-scale burning of forest, destruction of natural habitats and the consequent reduction of species of fauna an flora are some of the conspicuous results of jhuming. It is often said to be damaging the environment. Atleast 6.2 lakh families are engaged in jhuming covering 1.73 million hectares of the hilly region of Northeast India. This system is a big threat to the bio-diversity of the region. Keeping these aspects in mind the Ukhrul district of Manipur was selected for indepth study. In this paper an attempt has been made to asses the loss of forest cover and the loss of flora and fauna in Ukhrul district.

Introduction

Northeast India is known as the 'bowl of diversity'. The thick green cover of this area - said to be the water towers is disappearing at a faster rate than ever before, a phenomena that has stirred global concerns and activism. Forest loss, land degradation and loss of flora and fauna are visible in almost all upland areas of this region. The connection between loss of forest and tress on bio-diversity and other natural resources such as land, air and water has been well established. Mainstream thinking is that the existing hill farming system called *jhuming*, practiced by various hill tribes in the region are primarily responsible for the loss of forest cover. According to the MoEF (Ministry of Environment and Forest, 2001) Report, atleast 6.2 lakh families are engaged in *jhuming* covering 1.73 million hectares of the hilly region of Northeast India.

Slash-and-burn agriculture also referred to as shifting cultivation or bush fallow agriculture or *jhuming* is often said to be damaging the environment (Conklin, 1961; Cramb, 1989; Tobing, 1991) and is the primary cause of tropical deforestation (World Resource Institute, 1990; World Resource Institute and International Food Policy Research Institute, 2000; Indian Institute a of Remote Sensing, 2002). It is characterized by rotation of fields rather than by crops, by a short period of cropping (1-3 years) alternating with long fallow periods (upto 20 or more years but often as short as 6-8 years) and by clearing by means of slash and burn (Feizer, 1958). In addition shifting cultivation is associated with poor crop yields and rapid soil degradation (El Moursi, 1984; Christanty, 1986).

Jhuming has a disastrous impact on the ecology of the area. The burning of dried

wood results in loss of precious biomass and release of many harmful gases. The cutting down of lush green forests results in loss of forest cover which leads to land degradation and increase in the sediment load of rivers which is responsible for siltation of reservoirs. Leaching, erosion and loss of fertility of soil takes place rapidly. Land-water system which is the basic life supporting factor and a prime mover of socio-economic development has already fallen into the clutches of the law of diminishing returns with reduction of productivity vis-a-vis inputs and gross physical degradation of the system.

In Northeast India *jhuming* is a widely practiced food production system. It has been criticized on ecological and socio-economic grounds. Large-scale burning of forests, destruction of natural habitats and the consequent reduction of species of fauna and flora are some of the conspicuous results of *jhuming*. It has direct and indirect impacts on the ecosystem. It has become a system which is economically unviable and ecologically unsustainable. It is a system which leads to eco-degradation. It is a big threat to the bio-diversity of the region. Keeping these aspects in mind a micro area was selected for indepth study.

Data base and Methodology

The study is based mainly on primary sources of data which were collected through field surveys, survey of selected villages and sampled *jhum*ia households. The data was collected with the help of questionnaire interviews. Field work was done during 2001 and 2002.

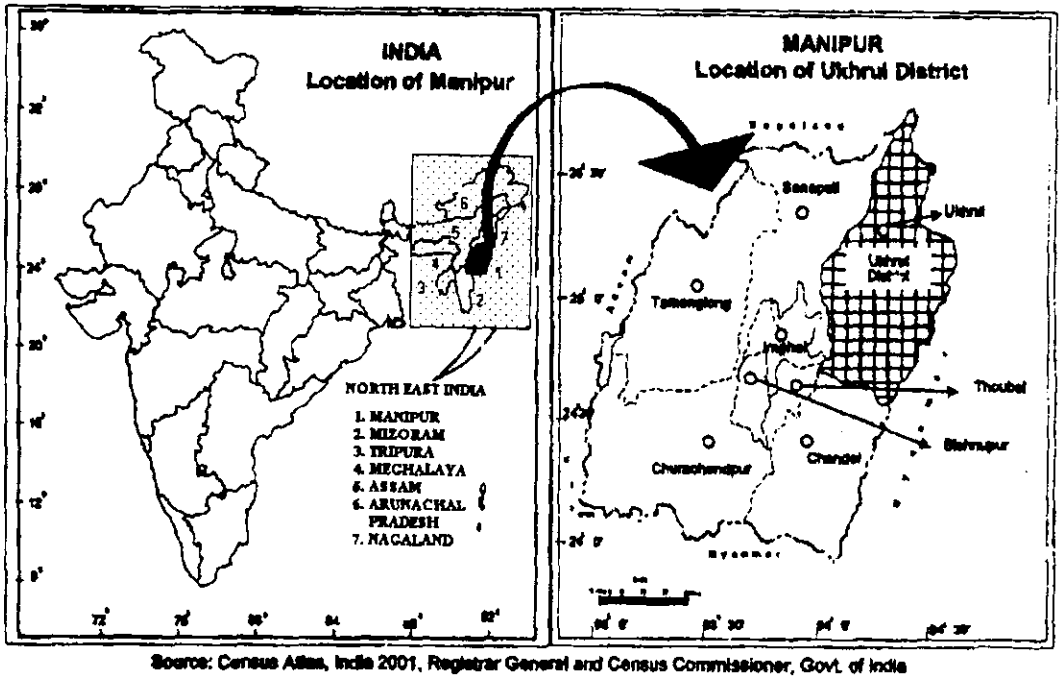
The following methods have been adopted.

1. Since the study is based on primary sources of data, a questionnaire was developed which is used in similar studies (Singh and Singh, 1978; Singh, 1978; Hussain, 1980; El Moursi, 1984; Christanty, 1986; Cramb, 1989; Tobing, 1991; Shah, 2003).
2. Data for assessing the loss of forest cover, flora and fauna were drawn from a comprehensive survey of 5 selected villages, each lying in different tribal blocks and inhabited by different tribes. Only 5 villages were selected for indepth study because of inaccessibility, bad or no roads, lack of transport, difficult terrain, tribal population and insurgency. The survey was conducted by foot.
3. In the 5 sampled villages, 10-100 per cent sampling of the *jhum*ia households was conducted to collect the information regarding the loss of forest cover, flora and fauna.

Study Area

Ukhrul district (94°0' to 94°45' east longitudes and 24°15' to 25°45' north latitudes) is the easternmost district of Manipur (fig. 1). The district is located at an elevation ranging between 388 and 2,834 metres above the mean sea level. It is bounded by the Imphal district on the south, Nagaland on the north, Senapati district on the west and Myanmar on the east. The total area of the district is 4,544 sq. km. and the total population is 140,946 (Census of India, 2001). Being a rural district most of the population is rural in character and comprises of tribals. The most predominant tribal communities living here are the *Tangkhul*

Manipur : Locational Setting



Source: Census Atlas, India 2001, Registrar General and Census Commissioner, Govt. of India

Nagas, Thadou and Vaiphei. The district is further sub-divided into five tribal development blocks spread over 222 villages. Five villages selected for sampling are situated in the different tribal development blocks. The whole district is having monsoon type of climate. It receives very heavy rainfall for seven months (April to October) in a year.

Ukhrul district is a land of beautiful mountains having moderate to steep slopes (98 per cent of the total area) interspersed by numerous tribal habitats. Of the total population, 94 per cent comprises of tribal population. The predominant tribal communities living here are the *Tangkhul Nagas* and the *Kukis*. The tribals are traditionally bound and they practise primitive agriculture. *Jhum* is a way of life for them. It is deeply embedded in their life style. Their needs, food habits, folklores, festivals and overall cultural ethos have a say in *jhum*.

For investigating this problem, Ukhrul district was found suitable because (a) of its location in the hilly area, its mountainous terrain, steep slopes and wet weather conditions which provides suitable conditions for *jhuming* and (b) its tribal population mainly the *Nagas* and *Kukis*, who are the main *jhum* cultivators and have been practicing *jhum* for centuries.

Discussions

Field surveys were conducted to observe the process of *jhum* cultivation in Ukhrul district. It was observed that *jhum* operation starts with the selection of *jhum* site which is allotted by the headman or the priest. All

lands around the village belongs to the community or the head of the village. In the months of November and December the land is cleared by slashing of trees either by the community collectively or by the individual family. Wood and twigs are allowed to dry. In March, when the weather is sunny the dried wood is burnt. In this process the top layer of the soil gets burnt. The burnt soil is scratched and by doing this the ash gets mixed up with soil. Now the land is ready for sowing of seeds which is done by traditional methods by digging sticks etc. Millets, small millets, maize, pulses, rice, vegetables etc. are cultivated. After harvesting, the same *jhum* land is cropped for 1-3 or 5 years and thereafter the land is abandoned to recuperate and another new land is selected for *jhum*. There is a definite *jhum* cycle which the *jhum*ias follow.

Five villages lying in the different tribal development blocks of Ukhrul district were selected for indepth study. About 8 to 21 households were sampled from every village (Table.1, fig. 1). The villages sampled are Lungphu (located in Phungyar-Phaisat Tribal Development Block), Yeasom (located in Kasom Khullen Tribal Development Block), Nungbi Khullen (located in Chungai Tribal Development Block), Mongkot Chepu (located in Ukhrul Tribal Development Block) and Maku Kuki (located in Kamjong Chassad Tribal Development Block).

Lungphu village is 50 km away from Imphal. It is situated at the peak of eastern range of Manipur Hills at an altitude ranging between 1,500-2,000 meters above m.s.l. The village has a total population of 477 and 73 households (6.5 persons per household). This village is occupied by *Tangkhul Nagas*. Of the total households (73), 67 households are practicing *jhum*. About 8 households (10.95 per cent) having a population of 67 persons were sampled. Of the total sampled households, 7 households are practicing *jhum*. Of the total land under cultivation (18.48 acres) belonging to the sampled

Table 1 **Loss of forest cover due to *jhum* in the sampled villages of Ukhrul district (2002)**

Sl. No.	Name of the villages sampled	Total No. of house-holds	Total No. of house holds practicing *jhum*	Sampled households		Total land under cultivation in the sampled household (in acres)	Loss of forest cover in *jhum* in the sampled households		Total loss of forest cover in *jhum* (in acres)
				Total No.	No. Practicing *jhum*		Total loss (in acres)	Loss per household (in acres)	
1.	Lungphu	73	67	8	7	18.48	14.86	2.12	142.04
2.	Yeasom	46	40	8	7	15.20	10.81	1.54	61.60
3.	Nungbi Khullen	186	176	21	20	19.62	16.31	0.82	144.32
4.	Mongkot	104	95	12	11		11.02	1.00	95.00
5.	Maku Kuki	6	6	6	6	9.58	9.58	1.60	9.60
Total	**5 Villages**	**415**	**384**	**55**	**51**	**98.15**	**62.58**	**1.18**	**452.56**

Source: Based on Field Survey (2002)

households. 14.86 acres of land was under *jhum*.

Yeasom village is 50 km. away from Imphal via Thoubal and 20 km away from the nearest market center at Yairipok. This village is situated at the top of the hill slope near the peak of southern most hill at an altitude of about 1,500 meters above m.s.l. This village has a total population of 239 and 46 households (5.2 persons per household). This village is inhabited by *Tangkhul Nagas*. Of the total households (46), 40 households are practicing *jhum*. About 8 households (17.39 per cent) having a population of 48 persons were sampled. Of the total sampled households, 7 households are practicing *jhum*. Of the total land under cultivation (15.20 acres) belonging to the sampled households, 10.81 acres of land was under *jhum*.

Nungbi Khullen village is 150 1 m away from Imphal. This village is situated at the peak of the highest hill range of Manipur at an altitude ranging between 2,000 to 2,500 meters above m.s.l. along the Ukhrul-Jessami road. This village has a total population of 985 and 186 households (5.3 persons per household). This village is inhabited by *Tangkhul Nagas*. Of the total households (186), 176 households are practicing *jhum*. About 21 households (11.29 per cent) having a pops elation of 130 persons were sampled. Of the total sampled households 20 households are practicing *jhum* and of the total land under cultivation (19.62 acres) belonging to the sampled households, 16.31 acres of land was under *jhum*.

Mongkot Chepu village is about 35 km away from Imphal. This village is situated on the hill slope along Imphal-Ukhrul highway near Litan, which is an important commercial center. This village has a total population of 689 and 104 households (6.6 persons per household). The village is inhabited by *Kuki Simte* tribes. Of the total households (104), 95 households are practicing *jhum*. About 12 households (11.53 per cent) having a population of 75 persons were sampled. Of the total sampled households, 11 households are practicing *jhum* and of the total cultivated land (11.90 acres) belonging to the sampled households, 11.02 acres of land was under *jhum*.

Maku Kuki village is 100 km. away from Imphal. This village is situated at the eastern most hill range of Manipur. This village has a total population of 39 and 6 households (6.5 persons per household). The village is inhabited by Kuki tribes. All the 6 households (100 per cent) were sampled. All of them are practicing *jhum* and all their land (9.58 acres) is under *jhum*.

1. Loss of Forest Cover

There is indiscriminate cutting and destruction of large quantity of forest trees and vegetation in the process of *jhum* in Ukhrul district. Though the exact information on this aspect is lacking in this region, yet people are aware of the degradation of forest. An attempt has been made to assess by field survey the cutting down of forest for the purpose of *jhum* in the sampled villages of Lungphu, Yeasom, Nungbi Khullen, Mongkot Chepu and Maku Kuki (Table. 1).

A perusal of table 1 shows that of the total sampled households in the five selected villages (55 households), 51 households were practicing *jhum* and 62.58 acres of land (98.15 per cent of total cultivated area) was under *jhum*. This shows that 62. 58 acres of land previously under forest has been cleared

for *jhum* by the 51 households. On an average 1.18 acres of land under forest per household has been lost. If this calculation is extended to the individual village and to the total number of households practicing *jhum*, the loss of forest cover works out to be 142.04 acres in Lungphu village, 61.60 acres in Yeasom village, 144.32 acres in Nungbi Khullen village, 95 acres in Mongkot Chepu village and 9.60 acres in Maku Kuki village. Thus in the five sampled villages, 384 households are practicing *jhum* and the *jhumias* have cut down 452.56 acres of forest for *jhuming* in a year. Hence, average area of forest lost in these five villages works out to be 90.51 acre per village. On this basis, if we calculate the total loss of forest cover in Ukhrul district where - *jhumias* living in 222 villages are practicing *jhum*, it works out to be about 20,093 acres or 8,135 hectares of forest which is being cut down per year for the purpose of *jhum* (Shah, 2003). Whatever area is under *jhum* was previously under forest.

This assessment of loss of forest cover in Ukhrul district is more or less accurate if we compare it with the figures given by Manipur Remote Sensing Application Centre, based on satellite imagery (TM/IRS, LISS II of 1986-87 and 1993-94 on 1: 50,000 scale). In 1986-87, an area of 14,231 hectares was under current *jhum* while in 1993-94, the area under current *jhum* decreased to 8,460 hectares (MRSAC, 1995). The figure of 2002 assessment, based on field survey is 8,135 hectares under current *jhum* (Shah, 2003). It shows a further decrease in the area under current *jhum* from the previous years but the area under abandoned *jhum* or fallow land has increased. This shows the continuation of *jhum* and the cutting of forests in Ukhrul district.

2. Loss of Flora

The flora of an area depends on the total environmental conditions of that area. It is common knowledge that disturbance of any one factor has its influence on the other like effect on vegetation as well as on flora. The vegetation of a region is the overall composition of dominant species and an account of the general physiognomy of the plant growth; the flora is an enumeration of all plants occurring in an area, usually without a commentary on dominance of individual species. Shifting cultivation influences both vegetation and flora.

All the stages of *jhuming* (like selection of the spot for cutting trees and shrubs, process of cutting trees and shrubs in the spot, burning of plant material, cultivation on this spot for varying number of years depending on the fertility of soil and finally abandoning the spot for a fresh spot) have direct or indirect influence on evolution of flora of the region. The soil of an area sustains plant growth and hence, changes in soil in turn affect the flora. *Jhuming* affects the soil mainly due to (a) the removal of the tree canopy, there is no obstruction to mechanical force, rain and the falling water dislocates soil, (b) rainfall causes increase in leaching and acidity of soil and (c) increases acidity, renders soil unsuitable for plant growth and makes it further unsuitable and vulnerable to washing away. The humus which would have been created by the falling leaves and other vegetable material is not available any more, further adding to acidity of the soils. Such disturbances affect the micro-flora and micro-fauna of the soil which in turn effects the flora.

Some observations regarding, the changes in the flora of the *jhum* land in the

study area are made. The area is gifted with rich flora and there are hundreds of varieties of trees, flowering plants, orchids of enumerable hues and kinds, epiphetic ferns, varied species of plants and shrubs. Some of the known species of plants and trees are *Alder, Prunush, Cirosirde, Symingtonia, Acacia auriculifornis, Parkia Javanica, Paraserrianthes falcolaria, Miachelia Oblanga, Omilina Arborea, Pinus Kerya, Robinia psedudoacacia* etc. (Table 2).

Table 2 **Types of-trees-under attack in Ukhrul district (2002)**

Name of the trees available	Main trees under attack
Alder (Alder Nepalensis), Prunush, Cirosirde, Symingtonia, Acacia auriculifornis, Parkia Javanica, Paraserrianthes falcolaria, Miachelia Oblanga, Omilina Arborea, Pinus Kerya, Robinia psedudoacacia etc.	*Phoebe hainesiana, Alder, Pinus Kerya, Parkia Javanica and orchids of enumerable hues and kinds, epiphetic ferns and various species of plants and shrubs.*

Source: 1.http://ukhrul.nic.in 2.Based on Field Survey (2002)

The following changes in flora of the study area attributable primarily to *jhuming* have been reported,

(a) In some spots certain trees and shrubs are scarce and may become further rare or even eliminated from the flora of the region e.g., *Phoebe hainesiana, Alder, Pinus Kerya* and *Parkia Javanica* etc. are becoming scarce in most of the area of Ukhrul district where *jhuming* is practiced.

(b) In the process of cutting trees and burning the site, many parasites and epiphytes get depleted or eliminated from the flora of the region e.g., unique species of orchids, epiphetic ferns and variant species of shrubs were collected from Ukhrul district but in subsequent visits it could not be located from the same area, as the area had been under *jhuming*.

(c) After the tree cover is removed components of the ground find the habitat no more suitable for their survival or reproduction but perished.

During the cropping periods several plant species, mostly weeds occur in the fields. The common ones are Spergula arvensis, Gnaphalium luteo-album, Galinsoga parviflora, Cardamine hirsuta, Polygonum runcinatum, Rumex nepalensis, Chenopodium album, Oxalis corniculata, Plartago major, Fridax procumbens, phorbia hirta, E. thymifolia, E. prosrtita, Spermacoce hispida and some annual grasses. After the land is abandoned the species that gradually establish are mainly Eupatorium adenospermum, Gynura angulosa, Ageratum conyzoides, Lantana Camara, Solanun nigrum and S. Xanthocarpum.

The flora of this area is one of the richest in India. But at present excepting some groves the vegetation is disturbed in most of the areas where *jhum* is practiced. It is a common sight to observe treeless grass covered hills in the study area.

3. Loss of Fauna

Wildlife in the natural situation constitutes the most important component of the ecosystem which participate effectively in the

energy flow and bio-economical cycling. Animal-plant and animal-animal can only participate in this unique process when its habitat and niche are preserved. *Jhuming* has led to habitat destruction and thus has threatened the very fabric of the survival of the wildlife. It destroys the habitat continuity, micro-habitats etc. The lost habitat is not possible to reclaim even after many years of abandoning the site.

The problems which crop up for the wildlife due to *jhuming* can be divided into two categories: Direct and Indirect. The direct problems which are associated with *jhuming* in relation to wildlife may be,

(a) Loss of habitat continuity which affects the wild animals, mainly elephants, tigers, leopards and other smaller mammals.

(b) Loss of top canopy occurs due to *jhuming* and this affects the behaviour of the langurs and gibbons. It also reduces the territorial area of species. Food exploration areas are reduced.

(c) In an exposed land due to *jhuming* the predator has more chance of being exposed against the prey. The result is loss of energy.

(d) The tigers and leopards capture prey from a hideout with distinct posture which are likely to be affected by *jhuming*.

(e) The small mammals like porcupines, manis, hedge hog etc. are affected because *jhuming* exposes them to unknown situations.

(f) The *jhum* site cannot be reclaimed and restored to in relation to wild life, when the *jhum*ias stop *jhuming* at that particular site. In fact restoration requires many more years. New forest area with natural habitats are being destroyed. Thus, accumulated harmful affects of *jhum* destroy wild animals.

(g) *Jhum*, a hundred years ago and a, *jhum* at present, so far the total effect on wildlife is concerned, is multiplied many times because it is now associated with the similar irreversible destructive patterns.

Indirectly *jhum* affects much more seriously than the direct methods.

(a) *Jhuming* upsets the ecological balance which brings imbalance in the hydrological cycle. It further disturbs the habitat. This ultimately affects the survival of the wildlife.

(b) Soil erosion reduces the soil fertility which further reduces the total energy production of the forest resulting in the shrinkage and loss of wild animals.

(c) Silting of the river causes floods and this leads to loss of wildlife in the plain areas.

The age old practice of *jhuming* at present has become very harmful due to shorter *jhum* cycles, shrinkages of forest area etc. This has resulted in destruction of habitat and the survival of wild life. The tropical forest of Ukhrul district is also the habitat of many valued species of birds and animals. Many threatened species like *Tragopan blythii*, *Pangolin* (ant eater), *Salamander*, Tiger, Porcupine, Hooting Monkey, Leopard, big, small and medium sized black bears, elephants, wild buffaloes, wild boars, deer and stags, wild goats and many unidentified species are found in this region. Birds of various colours and sizes are also found here including some migratory birds.

The respondents from the five sample villages reported disappearing wild life from their villages and neighbouring areas. The Javan Rhinoceros which was seen roaming along the Khuga river valley in Churachandpur district as late as the beginning of 20th century, but now it is extinct from Manipur and hence from India. The Wild Ox of Myanmar known as *'santhou'* in Manipur was last seen thirty years ago (Forest Department, Government of Manipur, 1997). In all probability, these animals have vanished from Manipur forever. The Hoolock Gibbon, Stump Tailed Macaque, Slow Loris, Clouded Leopard, Golden Cat, Marbled Cat, Binturong, Spotted Linsang, Malayan Sun Bear, Smoth Indian Otter, Hog Badger, Malayan Giant Squirrel, Serow (Sabeng) and most other denizens of forest are making a precarious existence in the forest of Manipur and all of them are on the verge of extinction.

Among the birds, the White Wood Duck, Pink Headed Duck, Grey Leg Goose, Mallard, Brahmini Duck, Clucking teal, Plover, Hoover Crame, Brown Headed gull, Avocate White ibis, Glossy Ibis, Indian Shag, Open Bill stork, Black Necked stork and a host of others have become extremely rare, and many of them are probably extinct from the state.

Conclusion

The study reveals that *jhuming* is leading to forest degradation and ultimately to the loss of valuable flora and fauna. It has an adverse impact on the bio-diversity of this hilly region. The reason for the dwindling wildlife are not far to seek. An explosion of human population with diverse and intense human activities have had far reaching effects on wildlife. Rapid deforestation for *jhuming* has resulted in habitat destruction coupled with indiscriminate hunting of birds

Table 3 **Animals and birds which are under threat in Ukhrul district.**

Name of the available Animals and Birds	Threatened Species
Hoolock Gibbon, Stump Tailed Macaque, Slow Loris, Clouded Leopard, Golden Cat, Marbled cat, Binturong, Spotted Linsang, Tragopan blythii, Pangolin, Salamander, Tiger, Porcubine, Hooting Monkey, Leopard, Black Bears, Elephant, Wild Buffalo, Wild Boars, Deers and Stags, Wild Goats, Wild Ox etc. Among the birds, White Wood Duck, Pink Headed Duck, Grey Leg Goose, Mallard, Brahmini duck, Clucking-teal, Plover, Hoover Crame, Brown, Headed gull, Avocate White ibis etc.	Tragopan blythii, Pangolin, Salamander, Tiger, Porcubine, Hooting Monkey, Leopard, Black Bears, Elephant, Wild Buffalo, Wild Boars, Deers and Stags, Wild Goats, Wild Ox etc. Hoolock Gibbon, Clouded Leopard, Golden Cat etc. are perhaps extinct. Among the birds, White Wood Duck, Pink Headed Duck, Mallard, Clucking-teal, Avocate White ibis etc.

Source: 1. http://ukhrul.nic.in 2. Based on Field Survey (2002)

and animals. This has threatened many species which has led to their extinction. In the hills where people pride themselves as traditional hunters, it would be a pity soon enough if they are left with no animals to hunt.

On the other hand, it is almost impossible to stop a practice that has been going on for centuries which is closely associated with the tribal customs and traditions. So, methods have to be devised for improving upon *jhum* cultivation through increased production and less environmental destruction. As the message of conservation is yet to reach the interior hills of Manipur, only the economic development of the people would enable them to overcome the compulsions of over exploiting the living natural resources of the state.

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